Chapter 1

Defining and Explaining Quality Control

In This Chapter

▶ Reviewing customer- and statistics-based definitions of quality

▶ Applying your industry's quality standards

▶ Discovering how to prevent errors and inspect processes

▶ Focusing on the fundamentals of quality control

▶ Brushing up on the basics of Lean

▶ Surveying additional quality control processes

*W*elcome! Because you're reading this book, you've probably

✔ Been asked to lead a quality control initiative.

✔ Been assigned to a quality team.

✔ Heard your company CEO say quality is job #1.

✔ Heard rumors about new quality programs at your company.

Of course, you may simply be curious about the topic of quality control, and you want to discover more about how quality control affects your company and your job. We commend your dedication and initiative!

Quality control is a critical concept in every industry and profession. As globalization continues and the world becomes smaller, making it possible for consumers to pick and choose from the best products worldwide, the survival of your job and of your company depends on your ability to produce a quality product or service. In this chapter, we define the term "quality," and we introduce some important quality control concepts and methods.

Looking at Different Definitions of "Quality"

Everyone says that they want quality products or services, or a high level of quality, but what do they really mean? Is it possible to have too much quality? Without a clear definition of quality, you can't even begin to measure and evaluate it. In the following sections, we define quality in customer-oriented and statistical terms.

A customer-based definition of quality

What does the word quality mean to you? For most people, quality is associated with the idea of a product or service that's well done, looks good, and does its job well. We think of a quality product as one that lasts, holds up well under use, and doesn't require constant repair. A quality product or service should meet a high standard in many areas, such as form, features, fit and finish, reliability, and usability.

Most people use the word *quality* to mean "having a high degree of excellence," but like beauty, quality is in the eye of the beholder. If a consumer's desire is to have basic transportation at a low price, he would buy a Toyota rather than a Lexus. The Toyota may be a lesser grade of car, but is it of lower quality than the Lexus? That's up to the consumer to decide.

To complicate matters, the definition of quality changes over time. The Ford Model T was once thought of as a quality product, but if a dealership sold it today, it would be in the same quality class as the Yugo. Consumers' quality standards for cars have changed over time, just like they have for other products. As products and services evolve, consumer expectations tend to increase so that yesterday's quality product becomes tomorrow's junk.

What do these facts mean to your business? Quality, in the eyes of a business, revolves around meeting customer expectations — expectations that may be stated or implied. One action that sums up quality from a business perspective is when the customer returns after the sale and the product doesn't. Repeat business is probably the most basic measure of quality, because customers vote on the quality of your product or service with their pocketbooks. But unlike political elections, your customers vote daily, and new opposing candidates appear just as often to try to win your customers' votes.

The statistical definition of quality

As you may expect, the statistical definition of quality is a little more precise than other definitions, such as the customer-based concept, and is based on mathematics. When you measure quality statistically, you look for variation in a measurement between what the customer asks for and what you produce. The less variation you have, the higher the quality of your product or service.

All processes have some natural variation; you use statistics to detect abnormal variation that could cause you to produce a bad product or service. You can also use statistics to avoid testing every item that you produce. By testing a sample of what you make or deliver, you can use statistics to measure its quality and find out whether it meets customer requirements.

Setting Quality Standards

REMEMBER

After you as an organization decide on a definition of quality (see the previous section), you need standards against which to measure your quality. Why? Many standards are driven by the desire to safeguard the health and well-being of the people who use the products or services companies provide. Quality standards also are critical in support of international trade.

Almost every industry has an association or trade group that sets quality standards against which companies can measure the quality of their products or services. Industries also have their own government- or business-supported standards bodies for products important to them. The International Organization for Standardization (ISO) is an international body made up of the national standards organizations for almost every country. We cover standards in detail in Chapter 2.

Preventing Errors with Quality Assurance

Quality assurance focuses on the ability of a process to produce or deliver a quality product or service. This method differs from quality control in that it looks at the entire process, not just the final product. Quality control is designed to detect problems with a product or service (see the next section); quality assurance attempts to head off problems at the pass by tweaking a production process until it can produce a quality product.

REMEMBER

Don't get us wrong; we're not saying that quality assurance and quality control are unrelated. By continually improving your process, you improve the quality of your product or service. Probably the most well-known technique for improving a process is called the *Plan-Do-Check-Act,* or the *PDCA Cycle.* This simple but powerful tool requires you to

✔ Plan improvements to your process by looking for problems that affect the quality of your product or service.

✔ Make improvements by implementing small changes to minimize disruption to your process.

✔ Check production results to see if you've actually made an improvement.

✔ Act on what you discover and roll it out to the entire process.

Check out Chapter 3 for more information about quality assurance concepts.

Controlling Quality with Inspection

The most basic quality control technique is to inspect the results of your production or service-delivery process to make sure it conforms to customer requirements. In quality control terms, *conforming* means that an item meets customer specifications, and *nonconforming* means it doesn't. You inspect your product or service by measuring one or more of its properties and comparing the measurements to customer specifications.

WARNING!

Although inspection can ensure that 100 percent of the products or services you deliver to your customers are good, it can be a very expensive process, especially for high-volume, low-value items (such as common nails or shirt buttons). Also, inspection is impossible for items where testing can damage the product (such as testing a bullet).

Head to Chapter 4 for details about the role of inspection in quality control. We explain the challenges of inspection, how to overcome the challenges, and how to choose the best inspection method for your organization.

Applying Fundamental Quality Control Concepts

Your organization can implement several fundamental quality control processes to ensure that you produce or deliver a high-quality product or service. The following sections present the information you need to determine how you can integrate quality control processes into your organization.

Introducing quality control to your business

REMEMBER

The introduction of a quality control process into an organization can be a major shock to its system. The following components are crucial if you want to lessen the shock and gain acceptance within your organization:

- ✔ Advertise acceptance of the program from important stakeholders within your organization.
- ✔ Give communication power to a sponsor who can articulate the need for change and who has the political power to gain compliance when required.
- ✔ Communicate the reasons for the change and the benefits it will bring to everyone in the organization.
- ✔ Train employees in the new ways of the organization. You want workers doing the right things consistently because success helps to gain support.

Like most other changes, quality control is best introduced in small bits. One way to do this is to create a pilot project that allows you to make a small change to a small part of your process to see the change's effect. If the results are good, you can implement the change on a wider basis; if the change is bad, you've limited the damage done. See Chapter 5 for the scoop on successfully introducing quality methods to your company.

Listening to your customers

An important concept in quality control is listening to the customer; we call this listening to the *voice of the customer* (the VOC). Although this task seems pretty simple (can't you just ask?!), you may find that your customers don't know exactly what they need, or they can't articulate their needs. The customer typically has three desires:

- ✔ They want it good.
- ✔ They want it fast.
- ✔ They want it cheap.

Of course, in the real world, consumers seldom get all three, so you need to identify what's most important in your customers' buying decisions, and you need to make sure you satisfy those needs.

You have several ways to hear the VOC:

- ✔ You can ask by handing out questionnaires, conducting interviews, reviewing complaints, holding focus groups, reviewing purchasing patterns, and interviewing field personnel.

✔ You can borrow good ideas from your competitors. Don't be afraid to use good ideas, no matter where you find them.

✔ You can use a good customer relationship management (CRM) system, which is a handy tool for gathering and analyzing data about customers.

Chapter 6 has details on listening to the VOC to improve the quality of your product or service.

Measuring your quality

The old management saying "You can't manage what you can't measure" rings especially true in quality control. A good measurement system helps you to know where you've been and where you're going. Customers typically require that you measure certain attributes of your product or service against their specifications. Your job is to determine what to measure, how to measure it, and when to measure it.

Employee training is critical to ensure that everyone involved in your process measures the same specifications in the same way. You also need to collect data in a usable format so that you can analyze it to determine the effectiveness of your quality process. The effectiveness of your quality process is directly related to the quality of your data collection and analysis process. If you don't have good data, you can't make good decisions.

Check out Chapters 7 and 8 for the nitty-gritty on measuring your current quality process.

Evaluating your quality

The most common way to analyze the data you collect is to use statistics. Statistics serve many purposes within quality control:

✔ Statistics allow you to determine which processes or parts of processes are causing your company the most problems (by using the *80/20 rule* — 80 percent of your problems are caused by 20 percent of what you do).

✔ You can use statistics for sampling so that you don't have to test 100 percent of the items you make.

✔ Statistics can help you spot relationships between the values you measure — even if the relationships aren't obvious. They also allow you to identify small variations in your process that can lead to big problems if you don't correct them.

Although statistics can seem daunting, you can use many simple tools to greatly improve your quality — tools that don't require an advanced degree

in statistics! Chapter 9 has all the information you need to evaluate your quality process with simple statistical tools.

Although much of statistics allows you to look back only at what has happened in the past, Statistical Process Control (SPC) allows you to identify problems before they can negatively impact the quality of your product or service. The basic idea behind SPC is that if you can spot a change in a process before it gets to the point of making bad products, you can fix the process before bad products hit the shelves. We cover SPC in Chapter 10.

Trimming Down with Lean Processes

Lean processes are the latest diet craze in the world of quality control! *Lean* is a quality control technique you can use to identify and eliminate the flab in your company's processes. The "flab" is all the dead weight carried by a process without adding any value. The customer doesn't want to pay for dead weight, so why should you?

 Most company processes are wasteful in terms of time and materials, which often results in poorer quality to the customer — a concern for all businesses. Lean focuses on customer satisfaction and cost reduction. Proponents of the technique believe that every step in a process is an opportunity to make a mistake — to create a quality problem, in other words. The fewer steps you have in a process, the fewer chances for error you create and the better the quality in your final product or service.

You can apply the Lean techniques in the following sections to all types of processes and in environments ranging from offices, to hospitals, to factories. In most cases, applying Lean concepts doesn't require an increase in capital costs — it simply reassigns people to more productive purposes. And, oh yes, Lean processes are much cheaper to operate. For a greater overview of Lean processes, check out Chapter 11.

Value Stream Mapping

People think in images, not in words, so giving them a picture of how something is done is often better than telling them about a process. After all, the quote is "Show me the money!" not "Tell me about the money!"

Value Stream Mapping (see Chapter 12) visually describes a production process in order to help workers locate waste within it. *Waste* is any activity that doesn't add value for the customer. Typically, eliminating waste involves reducing the amount of inventory sitting around and shortening the time it takes to deliver a product or service to the customer upon its order.

The 5S method

Work areas evolve along with the processes they support. As your organization implements new actions and tools, you must find a place for them "somewhere." Over time, clutter can slowly build as piles of excess materials or tools grow and gradually gum up the smooth flow of work.

The 5S method is an essential tool for any quality initiative that seeks to clear up the flow of work. Five Ss describe five Japanese attributes required for a clean workplace:

✔ Seiri (organization)

✔ Seiton (neatness)

✔ Seiso (cleaning)

✔ Seiketsu (standardization)

✔ Shitsuke (discipline)

Removing all the clutter from a process eliminates hidden inventories, frees floor space for productive use, improves the flow of materials through the workplace, reduces walk time, and shakes out unnecessary items for reuse elsewhere or landfill designation. Head to Chapter 13 for details about 5S.

Rapid Improvement Events

No one knows a process like the workers who touch it every day. They know how the work should flow, they can identify obstacles that slow everyone down, and they deal with problems that never seem to go away. So, why not tap this source of institutional knowledge and turn it loose to fix the problems that vex workers day in and day out?

A Rapid Improvement Event (RIE), which we discuss in Chapter 14, is an intensive process-improvement activity, where over a few days a company's workers bone up on Lean techniques and rebuild their processes to incorporate its principles. The workers take apart their work areas, rearrange items, and reassemble the spaces for more efficient work. The improvements are immediate, and the workers have ownership of the process and feel motivated to further refine it.

Lean Materials and Kanban

A company's materials are essential for the organization to work well, but they also tie up a large part of a company's capital. And while the company does its business year in and year out, its materials are stolen, damaged, rotting, corroding, and losing value in many other ways.

A key part of the Lean approach is to minimize the amount of materials (both incoming and finished goods) you have sitting around in your facility. (What do you know? This minimization is called Lean Materials.) Excess materials hide problems with purchasing, work scheduling, scrap rates, and so on. Eliminating these excess materials provides an immediate financial benefit to your company — if you eliminate correctly.

You don't want to eliminate so thoroughly that you cause shortages. One method you can use to fix the problem of excess materials without causing shortages is Kanban. Kanban is a materials system controlled by the customer. When a consumer buys an item, action cascades back up the production line to make one more of that item.

Turn to Chapter 15 for more information about Lean Materials and Kanban.

Checking Out Additional Quality Control Techniques

Okay, so Lean is interesting (see the previous section), but what other quality control techniques are available? Other quality methodologies have recently come into fashion, and we cover a few big ones in the following sections. They borrow from previous quality schools but provide their own twists that make it easier to accommodate different environments.

Total Quality Management

Total Quality Management (TQM), which we cover in Chapter 16, combines the work of important quality leaders, such as W. Edwards Deming, Joseph Juran, and Phillip Crosby, into a single quality improvement approach. You use TQM to improve the performance of processes by controlling variation — especially if your organization's products don't change frequently. TQM is very flexible and suitable to all types of organizations. It promotes a "quality culture," where a company trains everyone to focus on continuously improving the quality of everything the organization does. The concept includes the publication of a "quality strategy," whose application workers discuss at every meeting. It also requires the creation and use of quality measurement and monitoring tools.

Six Sigma

Six Sigma (see Chapter 17) is a great tool for driving difficult process problems back to their root causes. It uses process-analysis techniques and a broad

application of statistics to determine the process inputs that cause the undesired outputs. Minimizing the variation of inputs produces a more consistent product or service.

Six Sigma is designed to provide "breakthrough" results, whereas the results from Lean improvements are bit by bit. Six Sigma is the best tool for fixing stubborn, it's-always-been-this-way problems. However, it isn't the right tool for every difficult situation. Six Sigma techniques take time to work their magic. You should apply it only after other quality techniques, such as Lean, have removed the waste and clutter from your process.

Quality Function Deployment

Quality, as we note in the earlier section "A customer-based definition of quality," is how well a product's or service's characteristics fulfill customer needs and wants. Quality Function Deployment (QFD), which we cover in Chapter 18, is a disciplined approach to identifying customer needs and wants and translating them into product or service characteristics. Its technique is easy to understand but time consuming to implement.

Many businesses like the structured way that QFD breaks down customer requirements into various components. When complete, QFD assembles the information into a busy matrix called the *House of Quality.*

QFD's power is in improving cross-functional communication and decision-making within an organization. It focuses all workers on the true requirements of the customer and minimizes misinterpretation of customer needs.

The Theory of Constraints

Every company has goals it wants to achieve, usually tied directly to revenue. Company goals are the result of a chain of activities or processes. However, each chain has a weak link that limits how much it can produce — a limitation known as its *constraint.* The pace at which a chain produces is its *drum* (or *drumbeat*). In order to achieve company goals, you need to increase your drumbeat in order to increase overall process throughput.

The Theory of Constraints (see Chapter 19 for details) is a comprehensive technique for identifying and managing an organization's constraints for obtaining maximum throughput. In short, with this concept, you find the constraint, focus it on maximum throughout by eliminating its distractions, and only then, if required, expand it by hiring more workers or putting in more machinery. In many cases, a company's own policies and metrics are its worst enemies (even though they're so cheap to fix).